

# Claims

- [c1] 1. A pulse width modulation (PWM) power regulator, comprising:
- an error amplifier, for receiving a control signal via a control signal wire and an output voltage of the PWM power regulator;
  - a comparative circuit, connected to the control signal wire, for outputting an internal enable signal according to a pre-set threshold voltage;
  - a PWM output state, connected to the error amplifier and the comparative circuit, outputting the output voltage according to a triggering of the internal enable signal;
  - a switch, connected to the control signal wire and a ground; and
  - a fault detection circuit, connected to the switch, for outputting an internal fault signal to trigger the switch to ground the control signal when a fault condition within the PWM signal power regulator is detected.
- [c2] 2. The PWM power regulator of claim 1, further comprising:
- a filter connected to the PWM output stage for filtering the output voltage.

- [c3] 3. The PWM power regulator of claim 1, wherein the error amplifier has a common mode input range.
- [c4] 4. The PWM power regulator of claim 3, wherein the common mode input range is in a range of about 0V to about a target voltage.
- [c5] 5. The PWM power regulator of claim 1, wherein the pre-set threshold voltage is in a range of about 5 % to about 10 % of a target voltage.
- [c6] 6. The PWM power regulator of claim 1, wherein the pre-set threshold voltage is in a range of about 0.05 V to about 0.5 V.
- [c7] 7. The PWM power regulator of claim 1, wherein the fault condition comprises an over current condition, an over voltage condition or an over temperature condition.
- [c8] 8. A power supply system, comprising:
  - a central controller, having at least one soft-starting circuit; and
  - at least one pulse width modulation (PWM) power regulator, wherein the PWM power regulator comprises:
    - an error amplifier, for receiving a control signal via a control signal wire and an output voltage of the PWM power regulator;

a comparative circuit, connected to the control signal wire for outputting an internal enable signal according to a predetermined threshold voltage;  
a PWM output state, connected to the error amplifier and the comparative circuit for outputting the output voltage according to a triggering of the internal enable signal;  
a switch, connected to the control signal wire and a ground; and  
a fault detection circuit, connected to the switch, for outputting an internal fault signal to trigger the switch to ground the control signal when a fault condition within the PWM signal power regulator is detected.

[c9] 9. The power supply system of claim 8, wherein the control signal wire has only one signal wire.

[c10] 10. The power supply system of claim 8, wherein the PWM signal power regulator further comprises :  
a filter connected to the PWM output stage for filtering the output voltage.

[c11] 11. The power supply system of claim 8, wherein the error amplifier has a common mode input range.

[c12] 12. The power supply system of claim 11, wherein the common mode input range is in a range of about 0V to about a target voltage.

- [c13] 13. The power supply system of claim 8, wherein the pre-set threshold voltage is in a range of about 5% to about 10% of a target voltage.
- [c14] 14. The power supply system of claim 8, wherein the pre-set threshold voltage is in a range of about 0.05V to about 0.5V.
- [c15] 15. The power supply system of claim 8, wherein the fault condition comprises an over current condition, an over voltage condition or an over temperature condition.